PB-229 428

MUNICIPAL AND INDUSTRIAL WATER REQUIREMENTS CYPRESS CREEK RESERVOIR TEXAS

Public Health Service
Dallas, Texas

May 1960

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PB 229 428

MUNICIPAL AND INDUSTRIAL WATER REQUIREMENTS

CYPRESS CREEK RESERVOIR

TEXAS

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service, Region VII
Dallas, Texas

In Cooperation with the

DEPARTMENT OF THE ARMY
U. S. Army Engineer District - New Orleans, Louisiana

MAY 1960

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INTRODUCTION

General

In a letter dated February 11, 1959, the District Engineer, U. S. Army Engineer District, New Orleans, requested the Public Health Service, Region VII Office, Dallas, Texas, to prepare a preliminary evaluation of the need for water supply storage and its value (benefits) for each of the following streams:

1. Cypress Creek above Ferrells Bridge Reservoir.
2. White Oak Creek.
3. Little Cypress Creek.
4. Bayou Dorcheat.
5. Black and Cypress Bayous.
6. Bayou Bodcau.

Cypress Creek above Ferrells Bridge Reservoir is considered in the present report, and the studies of the other streams are presented in separate reports.

Acknowledgments

Acknowledgment is gratefully made for the assistance of the Texas State Department of Health, the Texas Board of Water Engineers, the Bureau of Business Research of the University of Texas, the New Orleans District of the Corps of Engineers, the Northeast Texas Municipal Water District, and the city officials and chambers of commerce of the cities of Mt. Pleasant and Winnsboro, Texas.

SUMMARY AND CONCLUSIONS

1. The site of the reservoir under consideration in this report is on Cypress Creek, in Titus County, Texas, southwest of the city of Mt. Pleasant.

2. The economy of the area is based primarily on agriculture, but industry is becoming increasingly important.

3. The existing downstream impoundment of Cypress Creek by Ferrells Bridge Dam has 250,000 acre feet of storage allocated to water supply. This should be adequate to meet the future needs of the area around and below the reservoir.

4. In the intervening area between Ferrells Bridge and the Cypress Creek site, the city of Mt. Pleasant, Texas, appears to be the only probable user of water from storage at Cypress Creek.

5. The population of Mt. Pleasant is projected to increase to about 36,500 by the year 2010. Corresponding water needs for municipal and industrial uses are estimated to be about 10 mgd.

6. The value of storage in Cypress Creek Reservoir to yield 10 mgd for Mt. Pleasant is calculated to be approximately 1.4 cents per thousand gallons. This value is based on the estimated cost of an alternate source on Blundell Creek.

DESCRIPTION OF THE AREA

Geography

Cypress Creek rises near the city of Cypress in northeast Texas and flows southeasterly to Caddo Lake near the Texas-Louisiana State line. Caddo Lake is a natural lake with additional man-made storage which drains to the Red River at Shreveport through Twelve Mile Bayou. Cypress Creek is impounded by Ferrells Bridge Dam in Marion County to form the Lake O' the Pines, a Corps of Engineers project. The tentative site for the Cypress Creek Reservoir under study in the present report is in Titus County southwest of Mt. Pleasant. Figure 1 is a map of the vicinity of Cypress Creek.

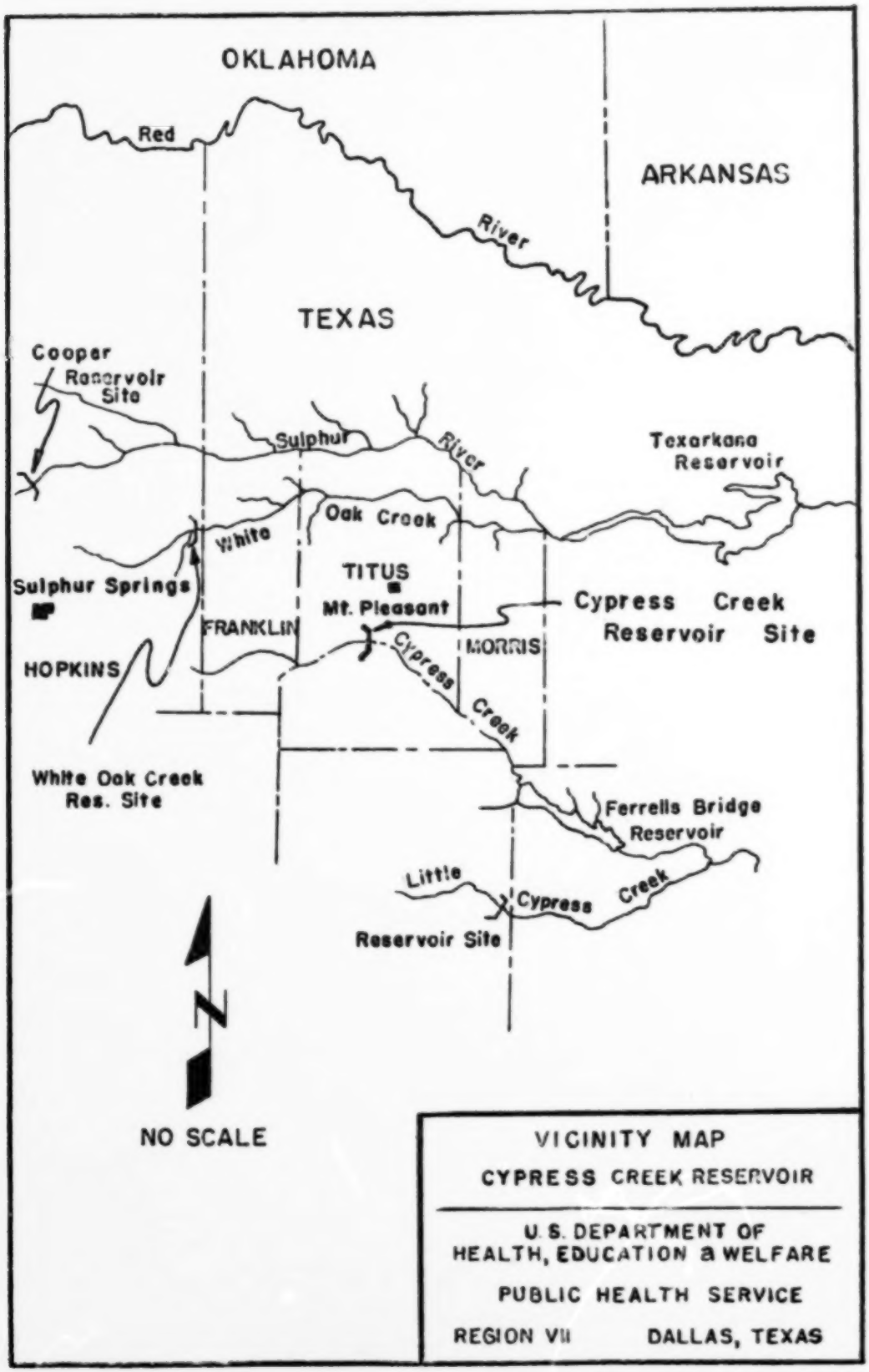
Cypress Creek traverses a wooded plain bounded by rolling hills. The watershed has an area of 2,812 square miles. The headwaters lie at an elevation of about 450 feet while the mouth at Caddo Lake lies at about 300 feet above mean sea level. The average rainfall for the region is about 44 inches per year and the mean annual temperature is about 64°F.

Economics

In terms of the number of people employed, northeast Texas is predominantly agricultural, although the industry present is important to the economy of the area. Approximately 38 per cent of the labor force in 1950 was engaged in farm work, while 14 per cent was employed in manufacturing. Including the agricultural services, the labor force employed or induced by agriculture numbered over one-half of the total labor force.

Because many farms did not support the farm families in the past, making it necessary for many farm operators to supplement their incomes by working away from the farms, there has been a decrease in agricultural employment since 1940. Farm production has changed little, the number of farms decreasing by 18 per cent between 1950 and 1954 while the average size of farm increased by 16 per cent. The decrease in agricultural employment resulted in a decline in population in northeast Texas between 1940 and 1950. However, the population has remained stationary since 1950 because the number employed in manufacturing has increased. The above patterns for northeast Texas are much the same for the immediate area of the proposed Cypress Creek Reservoir.

The production of petroleum is one of the primary industries in the area. Petroleum refining is practiced to a moderate degree, much of the petroleum produced being transported to other locations for refining. The logging and lumbering industry which was prevalent in the past, is declining; this may increase again with better timber management practices. Several plants engaged in clothing


OKLAHOMA
Red
River
ARKANSAS
TEXAS
Cooper Reservoir Site
Sulphur
River
Texarkana Reservoir
White
Oak Creek
TITUS
Sulphur Springs
Mt. Pleasant
Cypress Creek Reservoir Site
FRANKLIN
MORRIS
Cypress
Creek
HOPKINS
White Oak Creek Res. Site
Ferrells Bridge Reservoir
Little
Cypress
Creek
Reservoir Site
N
NO SCALE
VICINITY MAP
CYPRESS CREEK RESERVOIR
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PUBLIC HEALTH SERVICE
REGION VII DALLAS, TEXAS

FIGURE 1

manufacture and food processing have been added in recent years. Steel production at Lone Star, Texas, in Morris County, is confined to making pipe, principally for use in the petroleum industry.

Water Uses

Several municipalities in the Cypress Creek area have formed the Northeast Texas Municipal Water District to obtain water from the Lake O' the Pines created by Ferrells Bridge Dam. The District has contracted for 250,000 acre feet of storage from the Corps of Engineers and has a permit to withdraw 203,800 acre feet per year from Cypress Creek. The District has made application to the Texas Water Development Board for financial assistance in constructing a water treatment plant and distribution lines to the member cities. The members of the District are: Avinger, Daingerfield, Hughes Springs, Jefferson, Lone Star, Ore City, and Pittsburg. The principal source of water supply for these cities at the present is wells.

The city of Mt. Pleasant is now using an average of 1.0 mgd from small impoundments. A petroleum refinery located at Mt. Pleasant is using about 1.0 mgd, largely from one of the city's lakes in addition to wells. Ground water will not yield the entire needs of the city and the refinery because of the city's proximity to the western outcrop of the Wilcox Sand aquifer.

The city of Winnsboro is now using an average of 0.2 mgd from wells. The yield of these wells is considered adequate for future needs.

Table 1 presents a summary of water uses in the vicinity of Cypress Creek.

Table 1

Water Uses in the Vicinity of Cypress Creek

Municipality	1950 Population	Water Supply Source	Firm Yield (mgd)	Average Present Water Use (mgd)
Mt. Pleasant	6,348	Impoundments	1.0	1.0
Avinger	546	Wells	---	---
Daingerfield	1,668	Wells	---	0.35
Hughes Springs	1,445	Wells	0.26	---
Jefferson	3,164	Wells	---	0.375
Lone Star	900	Ellison Reservoir & Wells	---	0.10
Ore City	400	Wells	---	0.10
Pittsburg	3,142	Wells	0.8	0.5
Winnsboro	2,512	Wells	---	0.2

Water Quality

Underground water-bearing formations in the eastern portion of the Cypress Creek area are the Carrizo and Wilcox Group sands. Much of the ground water has high concentrations of iron and in some areas the pH is low. These deficiencies may be overcome by treatment at moderate cost. Otherwise the ground water is suitable for public water supply after disinfection.

The Texas State Department of Health maintains a water quality sampling station on Cypress Creek near Pittsburg. The limited data available indicate that the quality of Cypress Creek water is within the limits of the Public Health Service drinking water standards except that iron must be removed at some points in the basin.

Stream Pollution

The city of Mt. Pleasant discharges its wastes to Harts Creek which enters Cypress Creek below the tentative site for the Corps of Engineers reservoir. A petroleum refinery at Mt. Pleasant discharges its wastes to Cypress Creek through a tributary above the dam site. The refinery wastes would probably cause adverse water quality in the reservoir and should be discharged to the creek below the dam to prevent the damage. In order to prevent adverse water quality below the reservoir, a minimum stream flow of about 10 cfs should be maintained during the summer with a somewhat smaller flow during the winter.

FUTURE DEVELOPMENT OF THE AREA

Even though the numbers employed on the farms have decreased markedly in the recent past, agriculture is now, and probably will remain for some time, the most important source of income for the Cypress Creek area. Employment decline, however, is not resulting in decreased farm production because of increased farm labor productivity. The agricultural output of the area is likely to induce increased food processing activity. With agricultural income stabilized at a higher level, the relative magnitude of employment in the service industries will be greater in the future.

A favorable resource base exists in the vicinity of Mt. Pleasant to indicate that this area will grow appreciably, in conjunction with the rapidly growing national economy. Petroleumn extraction, aided by secondary recovery operations, will continue to be one of the primary industries of the area. However, it is expected to increase only moderately. The assurance of continued petroleum production may well encourage the expansion of the petrochemical industry. Although most of the expansion in the industry will probably be along the Gulf Coast, some expansion may be anticipated in northeast Texas if an ample supply of water is assured. Likewise, production increase in lumbering and wood products seems probable. With the ever-increasing demand for natural gas and with consequent changes in price relationships, there may well be a demand for the lignite of the area in the foreseeable future. There are promising deposits of unworked clays in Titus County which are suitable for brick manufacturing.

Aside from resource-based industries, Mt. Pleasant can be expected to attract its share of foot-loose industries. Fabrication of metal products, clothing, and electrical equipment and parts may be expected as population increases to justify more market-oriented manufacturing.

WATER PLAN

In the event that most of the storage under contract by the Northeast Texas Municipal Water District in the Lake O' the Pines were to be recontracted to private industries, the District might find it more economical to utilize water from the proposed Cypress Creek Reservoir because of the relative locations. However, the likelihood of this is not considered probable.

It appears more probable that the only municipality which would find it feasible to obtain water from the proposed Cypress Creek Reservoir is the city of Mt. Pleasant, Texas. The population of Mt. Pleasant is expected to increase to about 36,500 by the year 2010. The water need at that time for municipal and industrial uses will be about 10 mgd average use.

The city of Mt. Pleasant has considered several sources for future water supply development. Engineering studies have been made on reservoir sites on Blundell Creek and on Cypress Creek by the city. The most economical alternate site for a single-purpose, water-supply reservoir is considered to be the one on Blundell Creek. The difference in transmission costs from this alternate site or from the Corps site would be quite small, and within the limits of these estimates, the value of storage in the Corps of Engineers reservoir on Cypress Creek is essentially equal to the cost of storage on Blundell Creek. On this basis, the value of water supply storage in the proposed Corps of Engineers project on Cypress Creek to yield 10 mgd is estimated to be 1.4 cents per thousand gallons.

APPENDIX

EXHIBIT A

Basic Data and Assumptions Used in Calculations

1. Distances, pumping heads, and unit transmission costs would be the same from the proposed Corps of Engineers project site as from the alternate site on Blundell Creek.

2. Unit cost of storage at Blundell Creek was obtained from estimates prepared in 1955 by Forrest and Cotton, Consulting Engineers, and was trended to 1960 by use of the Engineering News Record cost index.

BIBLIOGRAPHY

1. Texas Board of Water Engineers, Texas Water Resources Planning at the End of the Year 1958, Austin, Texas, December 1958.

2. _____, Water Use Reported by Municipalities and Industries in Texas, Austin, Texas, June 1958.

3. University of Texas, Bureau of Business Research, Water for the Future, Austin, Texas, 1956.

4. Texas Almanac and State Industrial Guide, A. H. Belo Corporation, Dallas, Texas, 1958.

5. Arkansas-White-Red Basins Inter-Agency Committee, Arkansas-White-Red River Basins, Part II, Section 8, Domestic and Industrial Water Supply, 1955.

6. U. S. Bureau of the Census, Decennial Census Reports, 1900 to 1950.

7. U. S. Geological Survey, Water Supply Papers, Washington, D. C.

8. _____, Water Quality Papers, Washington, D. C.

9. U. S. Public Health Service, Report on Water Pollution, Sabine River Basin, Dallas, Texas, April 1952.

10. Forrest and Cotton, Consulting Engineers, Report on Lower Blundell Creek Dam and Reservoir, (Prepared for the Titus County Water Control and Improvement District Number 1, Mount Pleasant, Texas) Dallas, Texas, 1955.

11. Brown and Root, Inc., Engineers, Contractors, letter report dated September 2, 1954, addressed to Mount Pleasant Chamber of Commerce, Mount Pleasant, Texas, concerning a single-purpose reservoir on Cypress Creek, signed by W. M. Powell.

12. W. A. Burton, Civil Engineer, letter report dated October 5, 1954, addressed to Mount Plesant Chamber of Commerce, Mount Pleasant, Texas, concerning a single-purpose reservoir on Blundell and Smith Creeks.